Reversible Dimerization/Polymerization of a Janus Diradical Producing Labile CC Bonds and Giant Chromism

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Multifunctional materials require of building blocks able to easily and reversibly tune their chemical structure in response to soft external stimuli. In this regard, chromism is a valuable property for functional materials often related to π-conjugated organic dyes in which alteration of the π-molecular structure gives rise to different electronic shapes before and after the color mutation. There are plenty of good examples of thermo- and electro-chromic polymers, however, only a few cases based on small molecules, mainly related to mono-radicals. Even more uncommon examples are those related to diradicals, like phenalenyl based ones that forms stair-chain oligomers[1] or a tetrafluorobisimidazol diradical with a strong photochromism mediated by a double dimerization. [2]

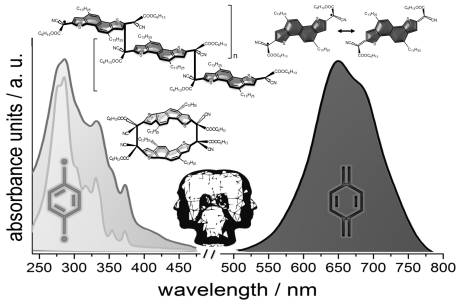

Figure 1. UV-Vis-NIR electronic absorption spectrum of monomer and σ-aggregates

With this communication we present a spectroscopic and theoretical study of the reversible diradical σ-dimerization/polimerization of a new naphtodithiophene derivative, depending on different external mild conditions, that is accompanied by a strong chromism originated by the transition from quinoidal to aromatic cores during the process.

References

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